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KEEPING UP WITH THE WATERFOWL

By Frederick C. Lincoln

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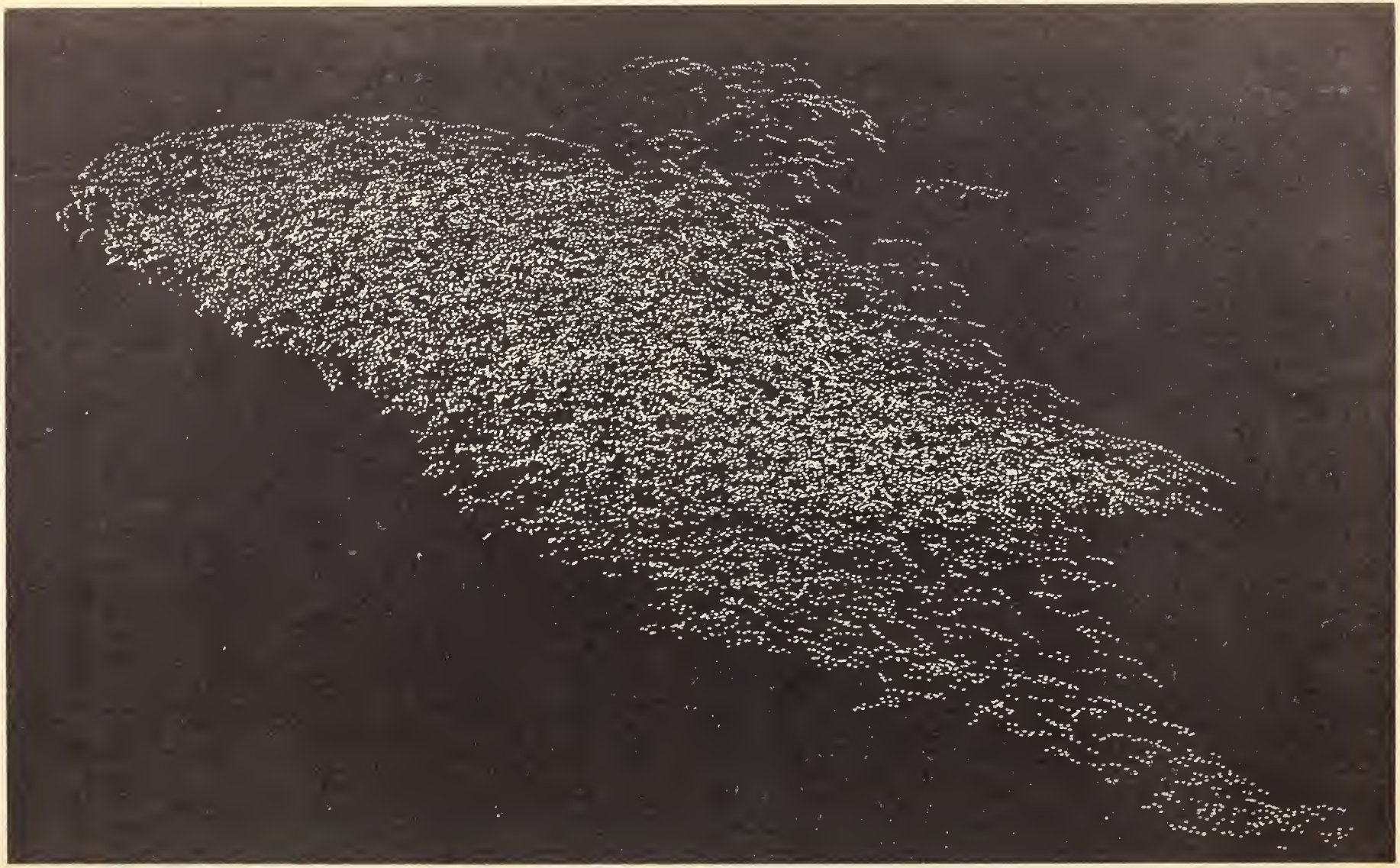


Greater snow geese resting on Delaware Bay were caught by the camera March 29, 1946 in this unusual aerial photograph. Actual count of geese in the flock: 13,449. Aerial photography is being used increasingly in waterfowl surveys. Study of such photographs helps observers improve the accuracy of their estimates of the numbers of birds seen from the air. (Photograph by Army Air Forces)

United States Department of the Interior, J.A. Krug, Secretary
Fish and Wildlife Service, Albert M. Day, Director

Wildlife Leaflet 294

Chicago, Ill. * April 1947

KEEPING UP WITH THE WATERFOWL

By Frederick C. Lincoln, Biologist,
Office of the Director

How many ducks and geese are there in North America? We don't know, we can only estimate.

But estimates do help us answer the important question: Are there enough? The actual number makes little difference as long as there are enough. When estimates reveal that the numbers are declining, every effort must be made to protect the next season's breeding stock.

Each year the Fish and Wildlife Service makes a population estimate to find out if there is a trend up or down. Finding the practical answer involves keeping up with the waterfowl over a vast territory stretching from the Arctic to the Tropics.

Information is gathered from four principal sources. From observers who estimate the percentage of birds moving north and south each year; from the reports of the Service field personnel; from a check-count in the wintering grounds after the hunting season; and from records compiled on the recovery of banded birds.

For many years investigation was confined chiefly to the collection of observations on the spring and fall movements of all migrating birds made by volunteer observers who received no compensation for their services other than the satisfaction of assisting in a program of research sponsored by the federal government. Some of them have maintained an almost unbroken sequence of reports from a single station, and their twice-a-year observations constitute a local record of much ornithological value.

As study became more and more concentrated on game birds, it was necessary to add a second group of about 700 observers who were located in important waterfowl areas. This group is chosen to meet certain standard requirements. They must know the different species of ducks and geese; they must be as accurate as is humanly possible; and they must be without bias toward sportsman or bird-lover. If any evidence of prejudice is discovered in their reports, they are dropped from the list. No attempt is made to "reform" such an individual; he is simply replaced.

These observers report, not in numbers, but in estimated percentages, the increase or decrease of the different species. They report that the birds of each species are more or less numerous by so much per cent as compared with their observations on the same species during the previous comparable flight.

Reports are critically examined by the Fish and Wildlife Service and fitted into place as the waterfowl jig-saw puzzle is gradually put together. If reports are exaggerated, the fallacy usually shows up in comparison with other reports from the same area. One sportsman reported 250,000 ducks wintering on his property in a southern state. Yet a flyway biologist, with many years experience in estimating waterfowl concentrations, had flown over the property at low altitudes on several occasions, and never reported more than 18,000.

During the migrating, breeding and wintering seasons there is a constant flow of reports to Washington from the field personnel of the Service. These reports include those from the four flyway biologists who spend their summers on the breeding grounds. There they check on breeding conditions, water conditions, and on how well the birds are rearing their broods. The Canadian government has men who are doing the same thing. A reciprocal exchange of reports provides each nation with information.

When the waterfowl are settled in their winter quarters and the hunting season is over, the Service is ready for its annual January inventory, the culmination of its annual investigations. By this operation, in which as many as 2000 men may participate, an attempt is made to obtain a numerical estimate of the ducks and geese that are available to start the annual cycle again.

The five regional directors (the country as a whole is divided into five regions for administrative purposes) supervise the inventory, while the actual field work is directed by 70 game-management agents. Each agent is responsible for the inventory in his district, which may be an entire state. The largest and most important waterfowl states are cut up into two or three districts.

The agent makes his own estimate on the important concentration areas, checking by observations from the air, ground and water. So that other areas will be covered simultaneously, he enlists the aid of a corps of such trained observers as biologists, refuge managers, district agents and other Service field personnel, state game wardens, the police, officers of the National Park Service, Forest Service, Soil Conservation Service, colleges, universities and other agencies.

A whole navy of boats from the Service and the state game departments participate in this operation. Double coverage of all important areas is assured by the use of aircraft of several types belonging to the Service, the Coast Guard, the Naval Air Service and the Army Air Forces. These range from the light fast planes of the pursuit type, to heavy bombers, autogyros and blimps.

Standard instruction and report forms are furnished all those helping to estimate the birds. The formula for estimating the number allows for one duck per square yard. Since it is obvious that no raft of ducks is actually a parallelogram, but instead, that it tapers off at the ends and has open spaces in the general mass, we always subtract one-third from the original figure. We have used this formula since 1935, and it was worked out by the writer some fifteen years ago on Crane Lake in Illinois. It has been tested several times by aerial photography and the actual count on the pictures has shown that the estimate by eye is close. An observer's accuracy depends entirely upon his ability to estimate distances, not an easy task over water.

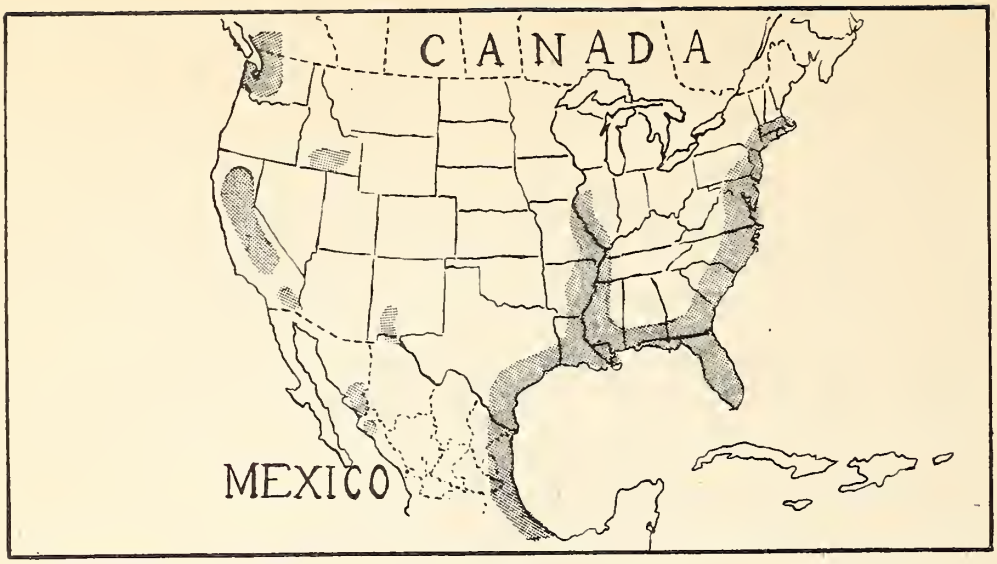
All reports are carefully studied for probable error by the game management agent. Then he makes his report and forwards it to the regional office, where a team, composed of the regional director and his assistant, the supervisor of law enforcement, the regional biologist and frequently one of the flyway biologists, reviews the information.

When the five regional reports are received in Washington, they are compared, along with data from Canada and, when obtainable, from Mexico and other countries to the south, and thus form the basis for the estimate of continental waterfowl population available to restock the breeding grounds.

Back in 1935, when this work was first undertaken, it was obvious that full coverage was not possible so consultation was had with the regional directors and others to determine the probable accuracy of the tabulated figures. It was decided that for various reasons, the total estimates made by the observers probably did not represent more than 25 per cent of the actual populations. Accordingly, in order to arrive at the estimate for the continental population of ducks and geese, the tabulated totals have been multiplied by four. Possibly 3 or even 5 should have been used, but since 4 has been consistently employed, the figures announced each year do show the current trends with reasonable accuracy.

Criticism has been made that this is only an estimate and not a "census." The Service has never claimed that it was more than that. But an estimate made at the same time, in the same areas, by the same qualified observers year after year, does reveal population trends of real value. It makes little difference whether the totals reported by any one observer are 25 per cent low or 25 per cent high, if he has consistently made the same error in previous years his figures are comparable and show the proportional upward or downward trends of the different species. As an aid to the practical management of a great migratory resource, this operation has proved its value.

Today with these comparative records as a guide to the up and down trend in populations, and with our refuge system well under way, we should be in a position to avoid a repetition of those dark days of the thirties when ducks and geese seemed to be proceeding toward the vanishing point. We have learned much from experience, we have improved our fact-finding techniques and increased our supply of facts. While the drought that has prevailed in some portions of the breeding territory during the past two years may not be the beginning of a cycle of weather and other environmental conditions as



Wintering Grounds of North American Waterfowl

Winter refuges on the south Atlantic coast, lower Mississippi Valley and Gulf coasts are of vital importance since almost all the birds of the Atlantic and Mississippi flyways winter within our borders.

The high quality of these wintering resorts have been impaired locally by the drainage of marshes and the dredging of the inland waterway which, by altering salinities, has reduced the value of vast areas for waterfowl.

Many of the winter concentrations of birds of the Central and Pacific flyways are in Mexican regions--in the east, on Laguna Madre and Tamiahua Lagoon; in the west, in the valley of the Yaqui, Mayo, Fuerte, Sinaloa and other rivers, and on Lakes Chapala, Patzcuaro and Cuitzeo.

unfavorable as that of the early thirties, it is nevertheless a warning to be heeded.

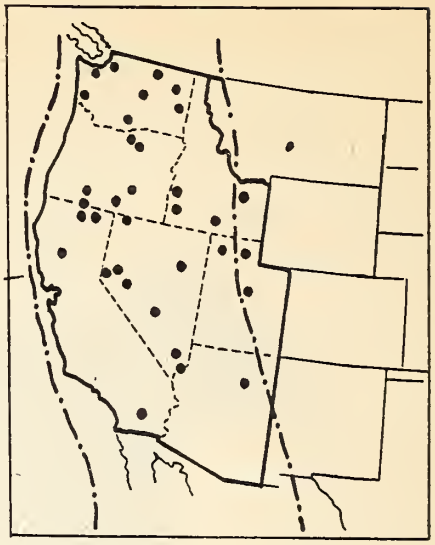
Today the movements of North American waterfowl are better known than those of any other continent, and the research which has contributed to this knowledge dates back 61 years to the time when the first government agency was formed to study birds. Since July 1, 1885, when the first small appropriation became available, knowledge has steadily advanced. In 1918, with the passage of the Migratory Bird Treaty Act, Congress gave recognition to the national and international character of the problems concerning migratory birds. To meet the obligations of the treaties with Great Britain and Mexico, the administration (as well as investigation) of migratory birds was put on a national basis. This included the authority to establish hunting seasons and other restrictions upon the taking of these birds of passage.

Breeding Grounds of North American Waterfowl

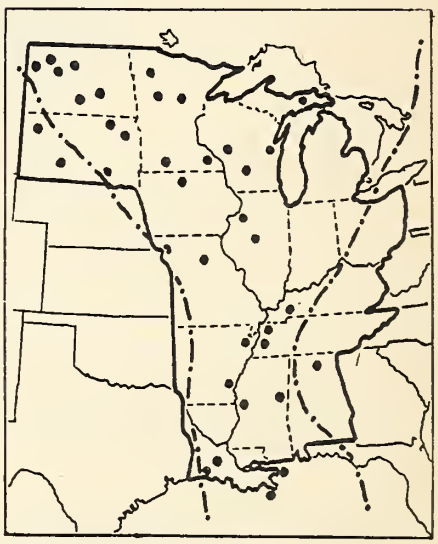
The shading in this breeding map is continuous but that does not mean that waterfowl occupy every acre. It does mean that every marsh and lake may serve as a breeding ground according to its facilities of food and cover, and where there is no disturbance by man.

The vast breeding grounds north of the agricultural zone in Canada, or "north of the bush," includes districts in northern Saskatchewan, and Alberta, particularly in the vast region of Lake Athabaska, and in the valley of the Mackenzie River all the way to its delta on the Arctic coast. They can contribute a great flight of birds if we permit breeders to go back to them. This is also true of Alaska where the huge valleys, flats and deltas of the Yukon, Kuskokwim, Tanana and other rivers undoubtedly produce most of the ducks and geese of the Pacific flyway.

The Pacific flyway with its migration routes and refuge system.



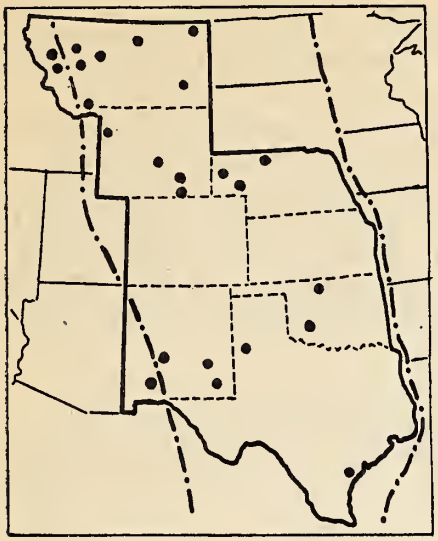
The large dots on the maps represent the principal migratory bird refuges within each flyway in the U. S.



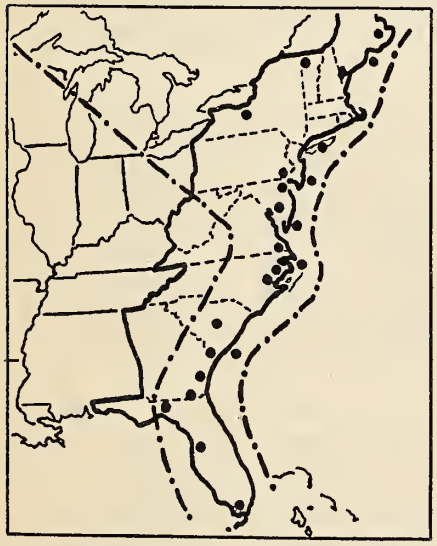
The Mississippi flyway with its migration routes and refuge system.

The four great North American flyway systems are vast areas, each of which includes breeding grounds, wintering grounds, a complex series of migration routes, and its own population of waterfowl. Their discovery resulted

The Central flyway with its migration routes and refuge system.



Birds in flight mark the principal migration routes taken by the waterfowl within each flyway system depicted.



The Atlantic flyway with its migration routes and refuge system.

from bird-banding operations by American and Canadian naturalists working with the U. S. Fish and Wildlife Service.

Our international commitment called for more information, if the birds were to receive adequate protection. A period of intensified investigation was ushered in. Bird-banding was expanded on a continental scale never before attempted. This work had begun in 1909, when the American Bird Banding Association was formed. In 1920, banding was taken over by the Biological Survey which was (in part) the predecessor of the Fish and Wildlife Service. In cooperation with Canada, all kinds of native birds were banded, but special attention was given to the waterfowl. Recovery of banded ducks and geese accumulated so rapidly that by 1930 it was possible to map out the four waterfowl flyways--great geographical regions, each with breeding and wintering grounds connected by a complicated series of migration routes.

It was discovered that the birds have a strong attachment for their ancestral flyways and by adhering more or less rigidly to any particular flyway, the ducks and geese tend to perpetuate not only that ancestral route but also the groups of individuals that use it.

Recovered bands showed that there is little interchange between the flyways, even when a species has a more or less general continental distribution. On some parts of the Canadian breeding grounds the birds of two or more flyways may intermingle freely, but when the time comes for migration, they separate and each group follows its traditional route to its wintering ground.

Birds may be abundant in one flyway and not in another. Suppose that wide-spread drought conditions in the Great Plains and Prairie Provinces of Canada should greatly reduce the birds in the Central flyway. At the same time, the birds of the adjacent Pacific flyway that come chiefly from British Columbia and Alaska, would be unaffected.

On the other hand, within a single flyway, one group of birds may be abundant while another group might be drastically reduced. In the Atlantic flyway, for example, the waterfowl population is made up of two distinct groups--one from the interior, the other from breeding grounds more or less coastal. Among the coastal breeders, the northeastern flight of black ducks, ring-necks and Canada geese might be thriving; yet at the same time the canvas-backs, redheads and scaups could be scarce, should drought be prevailing on their breeding grounds in the Prairie Provinces of Canada.

Such knowledge is of inestimable value in the constant effort to keep up with all elements of the waterfowl population and to give them the protection that they need when they need it most. For without this knowledge, it would be possible for a species to be exterminated in a single flyway although it might be abundant in others. If a species were wiped out in any one flyway, it would at best be a long time before that region could be repopulated.

Discovery of the importance of the flyways came just prior to the expansion of the refuge system which took place in the early thirties. The waterfowl were in a desperate plight. How could the refuge system be expanded to secure the greatest benefits in the shortest time? What were the most

strategic locations? Which areas were to be marked for priority of purchase and development?

Our knowledge of the flyways yielded the answers. We knew that in normal times the Mississippi flyway held the heaviest populations. When it was plotted and mapped for refuges, I had the pleasure of personally handing this plan to the late President Roosevelt. Today, a well-connected chain of refuges dots this important flyway from Medicine Lake in northeastern Montana and Seney on the Upper Peninsula of Michigan, south to White River in Arkansas and Delta in Louisiana.

There is an interesting "now it can be told" phase to this Mississippi flyway program. As chairman of the committee, I was involved in the intra-Bureau discussions that took place over which areas were to receive priority of purchase. On all (or almost all) of the lists prepared by the committee, White River, Arkansas, was given No. 1 priority, although at that time no member of the committee had ever worked in the area. White River is at the bottleneck of the flyway, and the great number of banded ducks that has been reported each season from this point of concentration has supported our judgment.

Although great progress has been made in the past fifteen years, our refuge system is not yet complete. The most critical need is for more wintering grounds. This is true in all flyways, but in the West, it poses some particularly knotty problems, for there our waterfowl wintering grounds are also excellent agricultural lands. In the East, the main wintering quarters are, for the most part, away from crop areas. On the Atlantic coast, the birds flock to the coastal marshes from Long Island southward. With comparatively few exceptions, there is no great amount of agriculture near these coastal marshes.

But in the West, even when the waterfowl population was at its lowest, there was a problem. As the birds increased, so did reports of depredations upon crops. Upon investigation, it has been found that some reports are based upon the desire of complainants to shoot birds out of season or even to shoot more birds during the open season without the necessity for observing the regulatory provisions as to bag limits. Some complaints, however, are genuine and suggest that we need more and better feeding areas distributed along the flyways, and additional improvements to the main wintering grounds.

The Skagit Flats in the state of Washington is a particular example. This coastal area lies due east of the southern tip of Vancouver Island and was once dairy country where prize herds of milk cattle were pastured. During the past 25 or 30 years, dairy production has gradually changed to the raising of cabbage and turnip seed. At the same time, a flock of widgeons that breed in Alaska, Yukon and British Columbia increased from 15,000 to 100,000 birds. Their ancestral winter home is in the Skagit Flats. Naturally, they are causing trouble for the farmers.

Farther south, in the old marshlands of the Sacramento, San Joaquin and Imperial Valleys of California, is the ancestral winter home of hundreds of thousands of pintails, mallards and other ducks and geese. These areas are

now amid the most productive agricultural regions of the country. Marsh plants have given way to rice, barley, lettuce and other cultivated crops, and the waterfowl have proceeded to make free use of them.

In the Snake River Valley of Idaho, the development of irrigation has brought agriculture to another great wintering ground. In the cornfields of northeastern Colorado, wintering flocks are also in conflict with the farmer.

The only way to ultimately meet this problem is to develop additional feeding grounds in such areas. In California, it will be necessary to purchase and develop around 40,000 acres of submarginal land for duck-feeding areas in the Sacramento and San Joaquin valleys.

As has been said many times, the refuges are a life insurance system for the waterfowl. If hunting is carefully regulated, it is believed that even when weather and other conditions are unfavorable, no single flight of birds could be completely wiped out as long as the refuges are there to furnish food, water and a place to recuperate. And when populations are high, and shooting regulations are liberalized, refuges provide a safeguard against mistakes that might be made in over-liberalizing.

Our waterfowl will always need management by regulation, based upon continuous investigation. The American system of hunting is the envy of the world, but to maintain it requires the best possible information regarding the status of game and the factors that affect it. Field studies never can be relaxed. Hunting has been called "a billion dollar industry," but the money spent in learning how to administer it is pitifully small. Research must be expanded.

Keeping up with the waterfowl is a job of the first magnitude. But with the experience already gained there is no reason why the supply of ducks and geese should not be kept adequate for reasonable sport and other enjoyment.

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